

### CLAIMS

1. System for the automatic analysis of images (I),  
such as images of DNA microarrays after  
5 hybridisation, said images (I) comprising a matrix  
of points or spots, the system being adapted to be  
associated with a sensor (10) for acquiring said  
images (I) and comprising a circuit (20) for  
processing the signals corresponding to said images  
10 (I) generated by said sensor (10), characterised in  
that said processing circuit (20) is configured  
according to a cellular neural network (CNN)  
architecture for the parallel analogue processing of  
said image signals.
- 15 2. System according to claim 1, characterised in that  
said sensor (10) is configured to acquire, as said  
images (I), fluorescence images from DNA  
microarrays.
- 20 3. System according to any of claims 1 or 2,  
characterised in that said cellular neural network  
architecture comprises matrix of cells (100) locally  
interconnected by means of synaptic connections,  
said matrix presenting a spatial distribution which  
is essentially correlated to the matrix form of said  
25 images (I).
4. System according to claim 1, characterised in that  
said sensor (10) is a matrix optical sensor.
5. System according to any of claims 1 or 4,  
characterised in that said sensor (10) is a colour  
30 optical sensor.
6. System according to any of claims 1, 4 or 5,  
characterised in that said sensor (10) is an optical  
sensor which is selectively sensitive to distinct  
chromatic components (R, G, B) of said images (I).
- 35 7. System according to claim 6, characterised in that

said processing circuit (20) is configured to process signals corresponding only to some (R, G) of said distinct chromatic components (R, G, B) of said images (I).

- 5 8. System according to claim 7, characterised in that said processing circuit (20) is configured to process signals associated only to distinct chromatic components (R, G) of said images (I) with the exclusion of the blue chromatic component (B).
- 10 9. System according to any of claims 6 to 8, characterised in that said processing circuit (20) is configured for processing the signals corresponding to said distinct chromatic components (R, G) of said images (I) in parallel.
- 15 10. System according to any of the preceding claims, characterised in that said sensor (10) and said processing circuit (20) are integrated in a single chip.
- 20 11. System according to any of claims 1 or 10, characterised in that said sensor (10) and/or said processing circuit (20) implement VLSI CMOS technologies.
- 25 12. System according to any of the preceding claims, characterised in that said processing circuit (20) is configured to perform on said signals corresponding to said images (I) at least one of the operations selected from the group consisting of:
- background clearing (201, 301) of said images (I),
  - grid analysis (202, 302) of said images (I),
  - 30 - elimination of smaller irregular spots (203, 303)
  - elimination of the larger spots (204, 304)
  - intensity analysis (205, 305) and
  - threshold definition (206, 306).
- 35 13. System according to any of claims 6 to 9, characterised in that said processing circuit (20)

is configured to combine the processing results (591, 592) obtained in relation to distinct chromatic components (R, G) of said images.

14. System according to claim 13, characterised in that said combination operation is a logic product (AND - 40).

15. System according to any of the preceding claims, characterised in that said processing circuit (20) comprises:

- at least one analogue memory (11) for storing signals corresponding to said images (I) and
- a control logic (13) for running real time processing sequences of said images.

16. System according to claim 15, characterised in that said images and the intermediate processing stages are stored by at least one analogue memory (11).

17. System according to any of claims 15 or 16, characterised in that said processing circuit (20) comprises means (15) for storing the configuration parameters of said cellular neural network.

18. System according to claim 17, characterised in that said configuration parameters are stored in digital form and said processing circuit (20) comprises a digital/analogue converter (14) to convert said parameters to analogue form in order to be input to said cellular neural network.

19. System according to any of the previous claims, characterised in that said processing circuit (20) processes said signals corresponding to said images (I) by applying sets of parameters (templates) of the cellular neural network.